

REMARKS

A Request for Continued Examination, and the requisite fee, accompany this paper for the purpose of removing the finality of the pending Office Action and obtaining entry of the above-indicated claim amendments.

Claims 2-7 and 29-35 are in the application, with Claim 2 having been amended, and with Claims 30-35 having been added. Claims 2, 31 and 33 are the independent claims herein. No new matter has been added. Reconsideration and further examination are respectfully requested.

Claim Rejections – 35 USC § 103(a)

Claims 2-5, 7 and 29 are rejected as being obvious over U.S. Publication No. 2002/0048137 of Williams et al. (“Williams”) in view of U.S. Patent No. 6,236,572 to Teshome et al. (“Teshome”).

Claim 2, as now amended, is directed to an “apparatus” that includes “a substrate” and “a pair of signal traces formed directly on the substrate and spaced from each other”. The apparatus of claim 2 further includes “a filler material directly on the substrate and between the signal traces”. In addition, claim 2 specifies that “the filler material ha[s] a dielectric constant that is higher than a dielectric constant of a material of which the substrate is formed”. Finally, the apparatus of claim 2 also includes “a solder mask layer directly on the signal traces and directly on the filler material” with “the dielectric constant of the filler material being higher than a dielectric constant of the solder mask layer”.

The present amendments to claim 2 consist in specifying that the solder mask is directly on the signal traces and directly on the filler material. Support for these amendments is found at FIG. 1 and, for example, at page 4, lines 13-15 (solder mask 46, filler material 44, traces 42 of metallization layer 36).

In explaining the rejection of claim 2, the Examiner relied primarily on the Williams reference, but acknowledged that Williams does not teach the solder mask layer. To make up for this deficiency of Williams, the Examiner proposed to modify the structure shown in FIG. 2 of

Williams by adding to that structure a solder mask layer like the solder mask layer 154 shown in the Teshome reference.

At the outset, applicants note that the purpose of the Williams reference is to provide capacitors built in to circuit boards. This is totally different from the purpose of the structure disclosed in the present application. The purpose of that structure is to improve performance of traces used for differential signaling. Applicants also emphasize that amended claim 2 calls for the solder mask to be directly on the signal traces and directly on the filler material. Even having the teachings of Teshome in mind, one of ordinary skill would not be led to modify Williams's structure to have a solder mask layer directly on Williams's metal regions 24, because to do so would prevent the structure from functioning as intended by Williams. More specifically, if a solder mask layer were directly on the metal regions 24, then the conductive layer 12 would not be present and presumably the high-dielectric constant bonding layer 14 also would not be present above the metal regions 24. As a result, the structure of FIG. of Williams, as so modified, would no longer function as a capacitor, and therefore would fail to operate as intended by Williams, and would fail to serve the purpose of Williams' invention.

It is therefore respectfully submitted that claim 2, at least as now presented, is patentable over the asserted combination of the Williams and Teshome references.

Applicants also wish to respectfully point out another reason why the rejection of claim 2 should be reconsidered and withdrawn. In explaining the rejection, the Examiner referred to the metal regions 24 of Williams' capacitor structure as "signal traces". However, the reference does not support this characterization of the metal regions 24. Nowhere does the reference indicate that the metal regions 24 are signal traces. Instead, the reference indicates, at paragraph [0021], that the metal regions are used as a ground plane for a capacitor. If the metal regions 24 were in fact signal traces, use of the same as a ground plane for a capacitor would interfere with their use as signal traces.

It is therefore respectfully submitted that the Williams reference fails to show the pair of signal traces recited in claim 2.

Claims 3-7 and 29 are dependent on claim 2 and are submitted as patentable on the same basis as claim 2. Moreover, claim 6, at least, is believed patentable on grounds independent of the patentability of claim 2.

Claim 6 adds the limitation that the filler material has a height that is substantially equal to a height of the signal traces. Claim 6 was rejected as obvious over an asserted combination of the Williams and Teshome references, with the Brandt reference (Pat. No. 6,068,782) also taken into consideration. In explaining the rejection of claim 6, the Examiner conceded that the limitation of claim 6 is not taught by Williams. To attempt to make up for this deficiency in Williams, the Examiner proposes to rely on alleged teachings of Brandt to the effect that “filler material 120” (so described by the Examiner) shown in FIG. 6 of Brandt is equal in height to the “signal line 190” (also so described by the Examiner), also shown in FIG. 6 of Brandt, and to modify Williams’ structure accordingly.

Applicants respectfully argue that there are at least two significant problems with the Examiner’s rejection of claim 6. First of all (as noted in the footnote on page 5 of the Response filed herein in August 2005), element 120 in Brandt cannot be considered filler material as recited in claim 2, because the patternable insulator 120 of Brandt has a low dielectric constant. In this regard, the Examiner is respectfully referred to column 2, lines 19-24 of the Brandt reference. Thus element 120 of Brandt cannot be the filler material having a higher dielectric constant than the substrate, as called for by claim 2.

Secondly, if the high dielectric constant bonding layer 14 of Williams’ FIG. 2 were reduced in height to match the height of the metal regions 24, then the conductive layer 12 of Williams’ structure would be in contact with the metal regions. This would prevent the structure from functioning as a capacitor. Accordingly, the Examiner’s reasoning in regard to claim 6 is directly contrary to the intended purpose of the Williams reference.

It is therefore respectfully submitted that even if claim 2 were not patentable, the rejection of claim 6 could not stand.

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New claim 30 is dependent on claim 2 and is believed to be allowable on the same basis as claim 2. Claim 30 is also believed to be allowable on grounds that are independent of the allowability of claim 2. Claim 30 adds the limitation of “a metal ground plane on an opposite side of the substrate from the signal traces”. Support for this limitation is found in FIG. 1 (ground plane 26) and page 3, lines 17-18 of the specification. This limitation is not taught or suggested by the Williams reference. Indeed, as noted above, the metal regions 24 of Williams, which the Examiner mistakenly identifies as “signal traces”, are in fact capacitor ground planes,

so that there would be no reason to provide a further ground plane on the opposite side of laminate (substrate) 22 from the metal regions 24.

New claim 31 is in independent form and is directed to an “apparatus” which includes “a substrate”, “a pair of signal traces formed on the substrate and spaced from each other” and “a filler material on the substrate and between the signal traces”. Claim 31 specifies that “the filler material ha[s] a dielectric constant that is higher than a dielectric constant of a material of which the substrate is formed”. In addition, the apparatus of claim 31 includes “a metal ground plane on an opposite side of the substrate from the signal traces”. Support for these limitations is found, for example, in FIG. 1 (substrate--element 34, signal traces--elements 42, filler material--element 44, ground plane--element 26) and the accompanying portions of the specification.

It is believed that this structure is not disclosed or rendered obvious by the prior art of record. For example, as noted with respect to claim 30, no such ground plane on the opposite side of a substrate from signal traces is disclosed in Williams (nor are signal traces disclosed in that reference). As another example, the Johnston reference (cited by the Examiner in an earlier Office Action) also lacks a pair of signal traces as recited in claim 30.

New claim 32 is dependent on claim 31 and is allowable at least because of its dependence on claim 31.

New claim 33 is in independent form and is directed to an “apparatus” that includes “a first substrate”, “a pair of signal traces formed on the first substrate and spaced from each other” and “a filler material on the first substrate and between the signal traces”. Claim 33 specifies that “the filler material ha[s] a dielectric constant that is higher than a dielectric constant of a material of which the first substrate is formed”. The apparatus of claim 33 further includes “a second substrate formed of the same material as the first substrate and on an opposite side of the signal traces from the first substrate” and “a metal ground plane on an opposite side of the second substrate from the signal traces”. Support for these limitations is found, for example, in FIG. 1 (first substrate--element 18, signal traces--elements 30, filler material--element 32, second substrate--element 34, ground plane--element 38) and the accompanying portions of the specification. No such apparatus is taught or suggested by the prior art of record.

New claims 34 and 35 are dependent on claim 33 and are allowable at least because of their dependence on claim 31. It is noted that the second ground plane recited in claim 34 is supported by element 16 shown in FIG. 1.

CONCLUSION

Accordingly, Applicants respectfully request allowance of the pending claims. If any issues remain, or if the Examiner has any further suggestions for expediting allowance of the present application, the Examiner is kindly invited to contact the undersigned via telephone at (203) 972-3460.

Respectfully submitted,



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